

## **Five-Year Review Report**

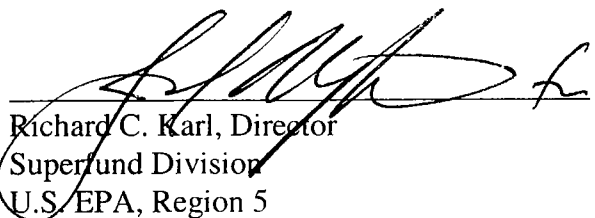
### **Second Five-Year Review Report for A & F Material Reclaiming, Inc. Superfund Site Greenup, Cumberland County, Illinois**

**September 2005**

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9/29/05

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## **List of Acronyms**

ARARs	applicable or relevant and appropriate requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
EDD	Enforcement Decision Document (equivalent to a ROD)
FS	feasibility study
GPS	global positioning system
IAC	Illinois Administrative Code
IC	institutional control
Illinois EPA	Illinois Environmental Protection Agency
MCL	maximum contaminant level
NCP	National Contingency Plan
NPL	National Priorities List
OU	operable unit
PAHs	polynuclear aromatic hydrocarbons
PCBs	polychlorinated biphenyls
PNAs	polynuclear aromatic hydrocarbons
PRGs	preliminary remediation goals
PRPs	potentially responsible parties
RA	remedial action
RBCs	risk based concentrations
RD	remedial design
RI	remedial investigation
ROD	Record of Decision
SMCL	secondary maximum contaminant level
SVOC	semi-volatile organic compound
TACO	Tiered Approach to Corrective Action Objectives
TDS	total dissolved solids
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

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## **Executive Summary**

The remedy for the A & F Material Reclaiming, Inc. site in Greenup, Cumberland County, Illinois, according to the June 1985 and August 1986 Enforcement Decision Documents, included some further removal of contamination from the site and the setting up of a program for "monitoring the natural purging and dilution of contaminants from the groundwater", which is really monitored natural attenuation. This remedy selection followed extensive removals of contaminated soils and sediments and the removal of tanks and buildings. A county and a village ordinance prohibiting the use of groundwater in the area of the site were passed in 2000 to implement the establishment of institutional controls that were specified as part of the remedy. The site achieved construction completion with the signing of the Preliminary Close Out Report on September 24, 1992. The trigger for this review was the signing of the first five-year review report in September 2000.

The assessment of this five-year review is that the remedy has been implemented in accordance with the Enforcement Decision Documents. The remedy has been functioning as anticipated with regard to the changes seen for many of the contaminants. It has been possible to drop most of the substances that were part of the monitoring program that began in 1990 because their concentrations have met the criteria established for their elimination from the monitoring program. However, four contaminants still remain in the monitoring program because their concentrations exceed the values established for their elimination. Although in most wells the concentrations of these substances are either decreasing or holding steady, the concentration of iron in one well has been increasing. In the case of iron and manganese there are some concentrations that exceed risk-based goal indicators. No effect on the river has been seen from the contamination in the groundwater.

The remedy is protective of human health and the environment in the short term and in the long term. Exposure pathways that could result in unacceptable risks are being controlled and monitored. The two groundwater ordinances currently in place prevent exposure to, or ingestion of, contaminated groundwater. Threats at the site have been addressed through removal of contaminated materials, maintenance of the site, and monitoring of the groundwater. Long term protectiveness will be achieved when groundwater action limits are met throughout the plume.

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### Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name (from <i>WasteLAN</i> ): A & F Material Reclaiming, Inc.		
EPA ID (from <i>WasteLAN</i> ): ILD980397079		
Region: 5	State: IL	City/County: Greenup/Cumberland County
SITE STATUS		
NPL status: <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify) _____		
Remediation status (choose all that apply): <input type="checkbox"/> Under construction <input checked="" type="checkbox"/> Operating <input type="checkbox"/> Complete		
Multiple OUs?* <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Construction completion date: 9/24/92
Has site been put into reuse? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
REVIEW STATUS		
Lead Agency: <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency _____		
Author name: Bernard J. Schorle		
Author title: Remedial Project Manager		Author affiliation: USEPA, Region 5
Review period:** _____ to 9/05		
Date(s) of site inspection: 8/30/05		
Type of review: <input type="checkbox"/> Post-SARA <span style="float: right;"><input checked="" type="checkbox"/> Pre-SARA</span> <input type="checkbox"/> Non-NPL remedial action site <span style="float: right;"><input type="checkbox"/> NPL State/Tribe-lead</span> <input type="checkbox"/> Regional discretion <span style="float: right;"><input type="checkbox"/> NPL-removal only</span>		
Review number: <input type="checkbox"/> 1 (first) <input checked="" type="checkbox"/> 2 (second) <input type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify) _____		
Triggering action: <input type="checkbox"/> Actual RA on-site construction at OU # _____ <span style="float: right;"><input type="checkbox"/> Actual RA start at OU # _____</span> <input type="checkbox"/> Construction completion <span style="float: right;"><input checked="" type="checkbox"/> Previous five-year review report</span> <input type="checkbox"/> Other (specify) _____		
Triggering action date (from <i>WasteLAN</i> ): 9/27/00		Due date: 9/27/05

\*--"OU" refers to operable unit

\*\*--Review period should correspond to the actual start and end dates of the five-year review in *WasteLAN*

**Issues:** The Consenting Defendants would like to discontinue groundwater monitoring and have the site deleted from the National Priorities List (NPL). Site deletion requires a determination that no further response is appropriate. Such a determination would be made after consultation with and concurrence of the state and consideration of whether the responsible parties have completed all appropriate responses. See 40 CFR 300.425(e). Current groundwater action limits, listed in the 1986 Enforcement Decision Document (EDD), have not been achieved and are not expected to be achieved in the near future for the four substances still being monitored. The groundwater concentrations of iron and manganese still exceed Region 9's preliminary remediation goals (PRGs) and Region 3's risk based concentrations (RBCs); these values are based on risk information. Five-year reviews will continue to be needed, which may require groundwater monitoring. See 40 CFR 300.430(f)(4)(ii).

**Recommendations and Follow-up Actions:** Over the next several months USEPA will review and address the Consenting Defendants' request to discontinue groundwater monitoring and the possible deletion of the site from the NPL. USEPA will continue to work with the Consenting Defendants and Illinois EPA regarding the development of an Explanation of Significant Differences (ESD) or a ROD Amendment, if necessary, and potential delisting.

**Protectiveness Statement(s):** The remedy is protective of human health and the environment in the short term and in the long term. Exposure pathways that could result in unacceptable risks are being controlled and monitored. Two groundwater ordinances are currently in place to prevent exposure to, or ingestion of, contaminated groundwater. Threats at the site have been addressed through removal of contaminated materials, maintenance of the site, and monitoring of the groundwater. Long term protectiveness will be achieved when groundwater action limits are met throughout the plume.



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**A & F Material Reclaiming, Inc. Superfund Site  
Greenup, Cumberland County, Illinois  
Second Five-Year Review Report**

**I. Introduction**

The purpose of the five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of the review are documented in a five-year review report. In addition, the five-year review report identifies issues found during the review, if any, and provides recommendations to address them.

The Agency is preparing this five-year review report pursuant to §121 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan (NCP) (40 Code of Federal Regulations (CFR) Part 300). CERCLA §121 states:

If the president selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each 5 years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section 104 or 106, the President shall take or require such action. The president shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

Region 5 of the United States Environmental Protection Agency (USEPA) has conducted the five-year review of the remedy implemented at the A & F Material Reclaiming, Inc. (A & F Materials) Superfund site in Greenup (Cumberland County), Illinois, a National Priorities List (NPL) site. Various names have been used for the site. This site should not be confused with the A & F Materials Company site in Olney, Illinois (Richland County), which is a site that is not on the NPL. This review was conducted for the entire site by the remedial project manager through September 2005. This report documents the results of the review.

This is the second five-year review for the A & F Material Reclaiming, Inc. site. The triggering action for this policy review is the signing of the first five year review report on September 27, 2000. The five year review is being conducted due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use or unrestricted exposure.

## II. Site Chronology

Event	Date
Waste materials reclaiming and processing facility operated at the site	1977 - 1980
Various removals to control or prevent releases and remove contaminated materials	1980 - 1984
Site proposed for the National Priorities List (NPL)	12/30/82
Placed as final on the NPL	9/08/83
Entry of a partial consent decree with four of the potentially responsible parties (PRPs) for a surface cleanup of contaminated soils and sediments	9/12/84
Consenting Defendants submit remedial investigation report	10/12/84
Consenting Defendants submit feasibility study report	1/18/85
Entry of a partial consent decree with one PRP for reimbursement	6/14/85
Enforcement Decision Document (EDD) issued by USEPA (Operable Unit One)	6/14/85
Remedial action conducted by Consenting Defendants removing soil and buildings and equipment, treatment and discharge of lagoon water, and site grading	1985
Enforcement Decision Document issued by USEPA (Operable Unit Two)	8/14/86
Entry of a consent decree for implementation of a groundwater monitoring plan	October 1989
Preliminary Close Out Report (construction completion under CERCLA)	9/24/92
Passages of ordinances by Greenup and Cumberland County mandating prohibition of water use on and near the A & F Materials site	June 2000
First five-year review completed	September 2000
Site inspection for the second five-year review	8/30/05

## III. Background

### Land and Resource Uses and Physical Characteristics

The operating facility within the A & F Materials site was located on about 3.8 acres of land on the border of the Village of Greenup, which is in east central Illinois. The site, which lies on the west side of the village, is bounded by open farmland and woodland, the local wastewater treatment plant, and private residences; a fairgrounds lie to the southwest. The site has a slope toward the Embarras River, which lies about 600 ft to the north, and drainage from the site reaches the river by way of a ditch along a railroad right-of-way that no longer contains track and now serves as a pathway to the river; this pathway lies west of the site and east of the municipal wastewater treatment plant. The wastewater plant has several lagoons and the discharge from the plant is into this ditch along the railroad right-of-way.

Based on information obtained in the remedial investigation reported in October 1984, site surficial soils in the area of the site are predominantly fine-grained, low-permeability materials which promote rapid runoff. Mostly, the top layer is alluvium. Underlying this is outwash sand and gravel which overlies the bedrock. The uppermost rock type is predominately a hard, silty, light to medium dark gray shale. At the site, the ground surface was roughly at an elevation of 525 ft and the surface of the bedrock is at approximately an elevation of 505 ft.

Three distinct aquifers exist at the site: alluvium till, present at or near ground surface; sand and gravel, present at shallow depths below ground surface; and bedrock. The shallow aquifer is a

poor water producer and is not used as a source of water supplies. It does, however, furnish recharge to the underlying sand and gravel. The sand and gravel outwash aquifer is a regionally significant unit, is present beneath the entire site, and receives recharge from the overlying alluvium. The bedrock aquifer is not significant in the project area. The lagoons constructed on site during operation of the facility were excavated into the unsaturated portion (and potentially a part of the saturated segment on a seasonal basis) of the alluvial aquifer. Neither of the unconsolidated aquifers encountered on site discharges to the drainage ditch, based upon water level information obtained during the course of the study. The drainage ditch, however, is probably a "losing stream" below the municipal sewage plant outfall and therefore may supply recharge to the underlying aquifers. The wastewater treatment plant lagoons, where the water levels are elevated above the land surface at the site, might also be leaking into the upper aquifer.

In the remedial investigation it was found that the alluvium forms an essentially level surface and contains groundwater at shallow depths, in the range of 8 to 12 feet below grade. According to the measured water levels, groundwater flow is directed downslope to the west and north of the facility. In the outwash sand and gravel aquifer, groundwater flow is generally downslope from the highlands east of the site, and flow in the level section of the study area is directed northward toward the Embarras River. Discharge is directed toward the Embarras River. The river channel may contact the top of the unit over much of its course. Water contained in the fractured section of the Pennsylvanian bedrock is present under strong artesian conditions. Recharge of the bedrock aquifer probably occurs from overlying units located elsewhere, where water levels are higher than those observed in the study area. Small amounts of petroleum and natural gas were liberated from the Pennsylvanian shales during well construction, indicative of the fact that natural groundwater quality is very likely poor.

### **History of Contamination and Initial Response**

The A & F Materials facility began operation in March 1977 as a recycling plant and continued until it shut down in 1980. The operation reportedly processed waste materials (including, but not limited to, oil, sludge, caustic, and sulfuric acid) into fuel oil and fire retardant chemicals. During the course of operations, there were numerous violations of the operating permit issued to A & F Materials by the Illinois Environmental Protection Agency (Illinois EPA). By March 1978, four storage lagoons had become full and began to overflow, contaminating the soil and drainage pathways leading to the Embarras River. In addition, thirteen steel storage tanks containing mixtures of waste oils (contaminated with PCBs (polychlorinated biphenyls) and organics), sludges, spent caustics, spent acids, contaminated water, and other waste products were located on the site. The tanks had failed on several occasions, releasing their contents.

After the facility closed in 1980, there were numerous preliminary investigations and short-term removal actions sponsored by USEPA and Illinois EPA to secure the site and prevent the release of contaminants.

The A & F Materials site was included on the proposed National Priorities List (NPL) in December 1982. The site was finalized on this list in September 1983.

In March 1980, May 1982, and December 1982, various actions were taken at the site to lower the immediate potential of releases. These actions included lowering the level of wastes in the lagoons, diking, trenching, and removal of some wastes off site. In March 1983, a temporary cap was placed over some consolidated sludge. In addition to these, there were two remedial actions for this site.

On September 12, 1984, a Partial Consent Decree was entered into by four of the potentially responsible parties (PRPs). The remedial action plan contained therein outlined the various phases of the planned site cleanup. Phase I was divided into two principal activities, the remedial investigation (RI) and the feasibility study (FS). The purpose of the remedial investigation was to determine the full extent of contamination at the site, including soils, surface waters, sediments, and ground water, and to provide the needed remedial information for the feasibility study. The purpose of the feasibility study was to determine the remedial response necessary to fully abate contamination identified. Phase II, an immediate removal action, included actions to prevent the threatened release of stormwater accumulated in the two lagoons. All oil, aqueous liquids, and sludges found in the lagoons, ponds, tanks, containers, and surface impoundments were removed. Tanks and containers found on the site were cleaned and removed. Air monitoring was performed and site security was provided. Phase III involved removal and disposal of contaminated soils and sediments, removal and disposal of the building and equipment, final site grading, air monitoring, and site security. The final phase (Phase IV) of the remedial action plan involved closure and ground-water monitoring requirements. Part of these actions resulted in the removal of 60,000 gallons of caustic waste, 4,000 gallons of PCB-contaminated oil, 10,000 tons of soil and/or sludge, and 20 drums of waste.

### **Site Risks**

In the remedial investigation report, the site risks and exposures were described in the following manner. A formal baseline risk assessment was not done. Since the lagoon sludge, wastewater, and oil, along with the tank waste, were to be removed, they therefore posed no environmental impacts or adverse health effects to the neighboring community. The primary concerns associated with the site were, therefore, with respect to the soil, sediments, and ground and surface waters.

Soils in the area of the tank farm were obviously contaminated, and, if left on site, would pose an environmental threat. Portions of the remaining soil had low levels of various contaminants. Several sediment samples taken from the drainage ditch also showed low levels of polynuclear aromatic hydrocarbons (PNAs or PAHs). These levels were fairly low and it was thought that they might be typical of naturally occurring PAH compounds in sediments. The sediments from the river did not have any substantial contamination. Neither the drainage ditch or river waters showed any contamination above trace or background levels.

The ground water wells gave variable results. Wells in the flow path from the contaminated areas showed elevated sulfate, total dissolved solids (TDS), and oil and grease values. Additionally, several metals were detected at levels higher than background and, in some cases, higher than the Illinois EPA standard for underground waters. Because of the dilution effect between the groundwater and surface water, it was expected that the groundwater would not cause con-

tamination in the river. Also, the planned removal of contaminated materials from the site was expected to remove the primary source of contaminants for the ground water. The apparently high flow rate through the sand and gravel aquifer, based on measurements made during the investigation, was expected to result in rapid flushing of any residual pollutants.

Based on the waste materials stored on the site and the history of spills that occurred, considerably less than expected contamination was shown to exist in the area immediately surrounding the site. Many factors may have contributed to this. The original lagoons used at the A & F Materials facility were lined with a synthetic liner to help prevent leakage and contamination of the surrounding environment. Also, approximately four years had elapsed between facility closure and the investigation and many natural attenuation mechanisms would have occurred, such as volatilization and biodegradation. The rapid groundwater movement through the site probably resulted in removing some of the initial contamination by diluting it into the surface waters. Surface runoff as a result of rainfall also reduced concentrations in soils. Some of the more persistent compounds such as the PAHs and various metals were still present at the site in low concentrations.

### **Basis for Taking Action**

Actual or threatened releases of hazardous substances from this site, if not addressed by implementation of the response action selected in the Enforcement Decision Documents, might present an imminent and substantial endangerment to public health, welfare, or the environment. This determination was based on the findings in the remedial investigation.

## **IV. Remedial Action**

### **Remedy Selected and Implemented**

An enforcement decision document (EDD) was prepared and signed on June 14, 1985 for the first operable unit (OU). An EDD is similar to a record of decision (ROD); the term is no longer used for decision documents. RODs are now the decision documents issued.

Final groundwater actions were the subject of the second and final OU, whose remedy was specified in the EDD USEPA issued on August 14, 1986.

The selected remedy in the 1985 EDD included:

- Soils and sediments
  - All soils contaminated over the recommended action levels, including soils containing greater than 1 ppm PCBs will be removed, and disposed of in a USEPA approved off-site facility.
  - Groundwater monitoring will be conducted to confirm that no further soil removal is required.
- Buildings and equipment
  - Equipment and structure of the buildings, including concrete floors, will be cleaned, dismantled, and removed from the site for disposal at a USEPA approved facility.

- Soil underlying the building will be tested and if found to be contaminated above the recommended action levels, will be disposed at a USEPA approved facility.
- Site grading
  - Site grading will include filling depressions to eliminate ponding, covering with sufficient topsoil, and providing and maintaining a vegetative cover to prevent erosion.
  - The fencing surrounding the site will be removed.

Under this EDD, an additional 1,600 tons of soil and/or sludge, 1,300 cubic yards of PCB-contaminated soil, and a process building with contaminated equipment were removed from the site. The soils remaining on the site after the 1985 soil removal were sampled and analyzed prior to placing clean soil over the area as fill. All compounds analyzed for, including PCBs, were at non-detectable limits using low-detection limits except for phenols (at 14 ppm, 3.5 ppm, and 3.3 ppm) and benzoic acid (at 2.1 ppm) in two areas. The entire area was then filled with clean soil, graded, and vegetated.

The selected remedy in the 1986 EDD included:

- Establish a groundwater monitoring program adequate to test the feasibility study conclusion that all residual groundwater contamination remaining after the 1985 cleanup will steadily decrease to safe levels by natural dilution and purging to the Embarras River without causing violation of water quality standards in the river or passing under the river. (Note that this "remedy of monitoring the natural purging and dilution of contaminants from the groundwater" is really monitored natural attenuation.)
- Establish institutional controls adequate to assure that drinking water wells are not placed in contaminated groundwater areas during the period of natural purging and dilution.
- Establish procedures for regular review of monitoring data until safe levels are reached or until data contradicting the feasibility study conclusions demonstrates the need to re-evaluate the selected remedy.

This remedy would eliminate the threat posed by groundwater conditions at the site by reducing the potential for human exposure to several organic and inorganic contaminants in the groundwater. The contaminants of concern are noted in Table 1; this is the list that was included in the 1986 EDD. Only those constituents that were found at levels above the analytical detection limits are shown. The "Maximum Level Found" values are those reported in the 1986 EDD. The "Groundwater Action Limit" values are those specified in the August 1988 *Remedial Action Plan for the A & F Materials Site* (RA Plan). The "Max. Detected 4/92" values provide an idea of the level of the parameters several years ago and several years after the final cleanup of the site was completed; some more recent results are presented later in this report.

The groundwater action levels specified in the 1986 EDD were to be the USEPA criteria listed in a table in the EDD. These criteria were, among other things, maximum contaminant levels (MCLs) and secondary maximum contaminant levels (SMCLs). There were no USEPA criteria listed in the table for 4 of the 23 parameters.

The monitoring program that was agreed upon with the Consenting Defendants used the action levels specified in the EDD to develop a program of monitoring for the parameters specified in

the EDD in which there was expected to be an eventual elimination of the monitoring program. This program is specified in the RA Plan. It consists of the elimination of parameters from consideration in a given well when that parameter has not been detected above the action limits specified for the stated period of time. The RA Plan lists what are called the "EDD Action Limit" values for the groundwater at several specified wells. These action limits are the action levels from the EDD plus a value added for one parameter (oil & grease) that was taken from the Illinois drinking water standard that was listed in the EDD. The RA Plan also contained "Proposed Action Limit" values for surface water. These were primarily taken from the Illinois general-use water quality standards. Only limited monitoring for parameter concentrations in the river was required in the plan. The RA Plan provided for the implementation of a contingency plan if it appeared that the municipal water well might be threatened, which never happened.

As part of the remedy resulting from the 1986 EDD, several additional monitoring wells were installed and a few existing wells were abandoned. The Preliminary Close-Out Report, which documented that all construction activities for the final operable unit at the site had been completed, was signed September 24, 1992.

In 2000, Cumberland County and the Village of Greenup adopted ordinances restricting water use on 67.63 acres that includes the A & F Materials site and some of the area around it. Both units of government had to act because part of this area is within the boundaries of the Village and part is outside. Thus the institutional controls that were specified in the 1986 EDD have been implemented. These controls are intended to prevent contact and use of the contaminated groundwater at and near the site.

### **Operation and Maintenance**

The Consenting Defendants are performing the monitoring of the groundwater and surface water. Except for periodic mowing, this is all that is required at the site.

### **V. Progress Since the Last Five-Year Review**

This is the second five-year review. Since the last review additional monitoring has been performed and what should be done with the site in the future has been undergoing consideration. It appears that it may take a considerably longer period of time before the final four parameters reach their specified action limits than had been anticipated when the second EDD was issued. There is an additional question as to whether they will ever reach their specified action limits and whether a change in the remedy, specified in an Explanation of Significant Differences (ESD) or a Record of Decision Amendment, for these contaminants may be necessary. The Consenting Defendants have asked that the monitoring be discontinued and that the site be deleted from the NPL. USEPA will continue to work with the Consenting Defendants and Illinois EPA regarding the development of an Explanation of Significant Differences (ESD) or a ROD Amendment, if necessary, and potential delisting.



## **VI. Five-Year Review Process**

### **Administrative Components**

The State of Illinois was formally notified of the upcoming five year review in a letter dated August 5, 2005. The review consists of: a review of past documents, including those documents that provided the history of the site; an examination of the monitoring reports prepared since construction was completed and the data that they presented; notification of the community that the review was to take place; site inspection; and report preparation and review.

### **Community Notification and Involvement**

An announcement that informed the public of the upcoming review was in the August 11, 2005 edition of the *Greenup Press*. In the announcement the public was told that comments concerning the site could be submitted through September 10, 2005. The announcement also reminded the public of the remedy selected and where site documents could be reviewed. The local information repository is at the Village of Greenup Municipal Building. No comments were received.

The public will be informed of the completion of the review and the availability of the report once the report is signed.

### **Document and Data Review**

The monitoring program specified in the RA Plan has been implemented. Over the years it has been possible to eliminate many of the parameters so that following the March 1999 sampling event only four parameters were being analyzed for, the others having been eliminated according to the procedures stated in the RA Plan: sulfate, iron, manganese, and total dissolved solids (TDS). In the 1986 EDD it was pointed out, "The most significant contaminants that have been found in the groundwater during the RI/FS are sulfates, high total dissolved solids, trichloroethylene, and metals." The sampling program has been temporarily suspended while it is being reviewed, but there were sampling events in November and December 2000 and in March 2004. In the 2000 sampling event, the event was to be in November, but well M15 could not be sampled because of flooding and the metal samples were not field filtered. So in December well M15 was sampled and metal samples that were field filtered were taken. During the 2000 event, the locations of the wells were measured using a global positioning system (GPS) unit because of a concern regarding the locations of the wells as shown on the site map.

How the concentrations of these four remaining parameters have varied with time since the monitoring program began is shown in Table 2. The locations of the wells are shown on the site map in Figure 1. The A & F Materials facility was east of wells M4 and M6 with its western border approximately 200 ft east of the abandoned railroad bed. Note that the concentrations sometimes exceed the EDD action levels in the two wells that are considered to be upgradient or background (M12 and M15) wells. The action levels for these four parameters are SMCLs, which are non-enforceable guidelines regulating contaminants that may cause cosmetic effects or aesthetic effects in drinking water.

Sulfate, iron, and manganese are substances whose concentrations may increase or remain at high levels in a reducing atmosphere in the groundwater because of the chemical changes that can take place involving substances in the soil. In a reducing atmosphere more soluble ions containing these elements, which are present in the soil or rock, can be formed that will be carried along with the groundwater. A reducing atmosphere might be formed if there are some organic substances present undergoing decomposition that remove the oxygen initially present in the groundwater and continue to exert a demand for oxygen. Dissolved oxygen and oxidation-reduction potential measured in the wells indicate that there is a reducing atmosphere in the downgradient wells. The organic substances might be materials left in the soil from the A & F operations or might be coming from the waters at the wastewater treatment plant, either through leakage from a lagoon or through recharge of the underlying soils from the drainage ditch downstream of the wastewater discharge into the ditch. There is also an abandoned oil and gas well southeast of the sewage lagoons that flows under artesian conditions that could be supplying some contaminants to the groundwater.

In the report for the March 2004 sampling event, the Consenting Defendants' contractor presented the results of linear regression analyses for these four remaining parameters in six of the wells (wells M4, M6, M9, M11, M13, and M15), except no analysis was done for sulfate in well M4 since this parameter was eliminated from consideration in this well about ten years ago. The correlation used was concentration as a function of time, with time measured in terms of the number of the quarter in which the sample was taken, with quarter 1 being the quarter of the first sampling event. The Consenting Defendants have subsequently corrected some errors that are in the information presented in the report.

Based on an approximate designation of increasing, decreasing, and steady, the TDS concentrations have been decreasing in all six wells, the iron concentrations have been increasing in well M9 and decreasing in the other five, the manganese concentrations have been decreasing in wells M4 and M9 and holding steady in the other four wells, and the sulfate concentrations have been decreasing in wells M6, M9, and M11 and holding steady in the other two wells. Some uncertainty regarding the calculated lines exists because there is more data in the early part of the time period and there is considerable scatter in the results. For example, the line for iron in well M9 (the correlation that shows the most pronounced increase in concentration) was examined. The calculated slope for this line is 0.0927 mg/l/quarter. There was only about a 10% chance of getting a correlation coefficient as large as the one calculated if no correlation existed. There would be a 80% chance of not being wrong if one were to say that this slope was different from 0.0, but not a 90% chance.

There have been no indications that contamination may be passing under the river. During the monitoring period there has been no indication that the contamination in the groundwater has affected the river. In the March 2004 sampling event it was determined that the groundwater flow direction was to the northwest. The groundwater levels near the river, on each side, were above the water level of the river, indicating that the groundwater is not passing under the river but discharging to it.

## **Site Inspection**

On August 30, 2005 the site was inspected by the state's project manager, a representative of the Consenting Defendants, and the remedial project manager. The site is still in very good shape. It is covered by vegetation that is being cared for by some party, as is the property between it and the railroad right-of-way. The field between the site and the river that once had been farmed is no longer being farmed and now contains weeds. The wells close to the site were in good shape; the wells near the river were not examined because of the heavy growth of vegetation. In all, the site and the surrounding area looked like it has for the past several years, since the inspection for the previous five-year review.

While at the site, the remedial project manager visited the village and the county offices and obtained copies of the signature pages for the ordinances that have been passed to restrict access to the groundwater in the area of the site.

## **Response to Comments**

No comments were received from the public.

## **VII. Technical Assessment**

### **Question A. Is the remedy functioning as intended by the decision documents?**

The review of the available information indicates that the remedy is functioning as it was intended except for the fact that a few of the parameters that were to be followed may not decrease below the action levels previously established.

The Consenting Defendants have reported that approximately \$100,000 has been spent on the site since 2000 on monitoring, reporting and oversight costs. Total project costs from November 1990 to 2000 were approximately \$609,000.

### **Question B. Are the exposure assumptions, toxicity data, clean-up levels, and remedial action objectives used at the time of the remedy selection still valid?**

There have been no major changes in the physical conditions of the site that would affect the protectiveness of the remedy. The site is being used as anticipated (that is, the site is not being used). Therefore, new exposure assumptions are not needed at this time.

Applicable or relevant and appropriate requirements (ARARs), as such, were not discussed in the August 1986 EDD. However, it did discuss "Consistency with Other Environmental Laws". Of the laws discussed, only those dealing with levels of contamination allowable in the groundwater and the river and with groundwater monitoring are still of interest.

The federal criteria for the groundwater have been mentioned above and consisted mainly of MCLs and SMCLs, but it was also noted in the EDD that the action levels included the  $10^{-6}$  cancer risk criteria. The SMCLs are non-enforceable criteria. There are now some state require-

ments for groundwater (in 35 IAC 620 ("Groundwater Quality"), which is part of Subtitle F ("Public Water Supplies") of 35 IAC), but these are no more restrictive than the federal requirements. The "drinking water standards" listed in the EDD appear to correspond somewhat with the requirements in Subpart C ("Public and Food Processing Water Supply Standards") of 35 IAC 302 ("Water Quality Standards"), which is part of Subtitle C ("Water Pollution") of 35 IAC; one difference noted is that the maximum concentration for dissolved iron is 0.3 mg/l in 35 IAC 302, Subpart C, whereas the EDD listed the criteria for iron as 1.0 mg/l for state drinking water.

The EDD also noted that because some contaminants were left in the soils where a lagoon had been, groundwater monitoring was required during the post-closure period (40 CFR 265.228(c)). There is presently no 40 CFR 265.228(c), but other parts of 40 CFR 265.228 require groundwater monitoring.

The Consenting Defendants have requested that USEPA consider using the "pathway exclusion" procedure available in the "Tiered Approach to Corrective Action Objectives (TACO)", 35 IAC 742, as a "to be considered" in determining what changes can be made in how the site will be addressed. TACO is used in conjunction with the procedures and requirements applicable to the "Site Remediation Program (35 IAC 740) and historically, the Site Remediation Program has not been used at a site that is on the NPL (35 IAC 740.105(a)(1)). USEPA will work with Illinois EPA and the Consenting Defendants to determine if the pathway exclusion can be considered in deciding the future course of action.

**Question C. Has any other information come to light that could call into question the protectiveness of the remedy?**

There has been no new information that would suggest that the selected remedy is not protective.

**Technical Assessment Summary**

According to the data reviewed and the site inspection and discussions with the Consenting Defendants, the remedy is functioning as intended by the two Enforcement Decision Documents, except that the concentrations of a few parameters have not reached the selected action limits, which for these parameters are the secondary maximum contaminant levels. There have been no changes in the physical conditions at the site that would affect the protectiveness of the remedy. Because some contaminants were left in the soils, USEPA will work with Illinois EPA and the Consenting Defendants to determine if the soil data will need to be evaluated to determine whether land use restrictions (e.g. restrictions to prohibit nonindustrial uses) are necessary.

**VIII. Issues**

The Consenting Defendants would like to discontinue groundwater monitoring and have the site deleted from the National Priorities List (NPL). Site deletion requires a determination that no further response is appropriate. Such a determination would be made after consultation with and concurrence of the state and consideration of whether the responsible parties have completed all appropriate responses. See 40 CFR 300.425(e). Current groundwater action limits, listed in the 1986 Enforcement Decision Document (EDD), have not been achieved and are not expected to

be achieved in the near future for the four substances still being monitored. For example, the groundwater concentrations of iron and manganese continue to exceed Region 9's PRGs and Region 3's RBCs. These values are risk based. Five-year reviews will continue to be needed, which may require groundwater monitoring. See 40 CFR 300.430(f)(4)(ii). However, the issue regarding future monitoring has no effect on the current or future protectiveness of the remedy.

## IX. Recommendations and Follow-Up Actions

Two items that will be addressed over the next year will be what to do about the monitoring and the possible deletion of the site from the NPL. It may be necessary to change the action limits that were set up previously through issuing a new decision document. The fact that some concentrations of iron and manganese not only exceed the SMCLs but also exceed the PRG and RBC concentrations shown in Table 1 has to be addressed; these latter concentrations are based on risk. Also, some concentrations exceed the Illinois groundwater quality standards for Class I groundwater (potable resource groundwater) given in Part 620 of Title 35 of the Illinois Administrative Code (IAC). USEPA will work with Illinois EPA and the Consenting Defendants to address this issue.

Any actions taken toward modification of the groundwater monitoring program or the deletion of the site from the NPL will not affect the current or future protectiveness of the remedy.

In summary:

Recommendation and Followup Action	Party Responsible	Oversight Agency	Milestone Date	Affects Current Protective-ness	Affects Future Protective-ness
Address Consenting Defendants' request to discontinue groundwater monitoring	USEPA	USEPA	1 year	No	No
NPL Deletion	USEPA / IEPA	USEPA / IEPA	1 year	No	No

## X. Protectiveness Statement

The remedy is currently protective of human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled and monitored. Two groundwater ordinances are currently in place to prevent exposure to, or ingestion of, contaminated groundwater. Threats at the site have been addressed through removal of contaminated materials, maintenance of the site, and monitoring of the groundwater. Long term protectiveness will be achieved when groundwater action limits are met throughout the plume.

## **XI. Next Review**

The next five-year review for the A & F Material Reclaiming, Inc. site is required in September 2010, five years from the date of this review.

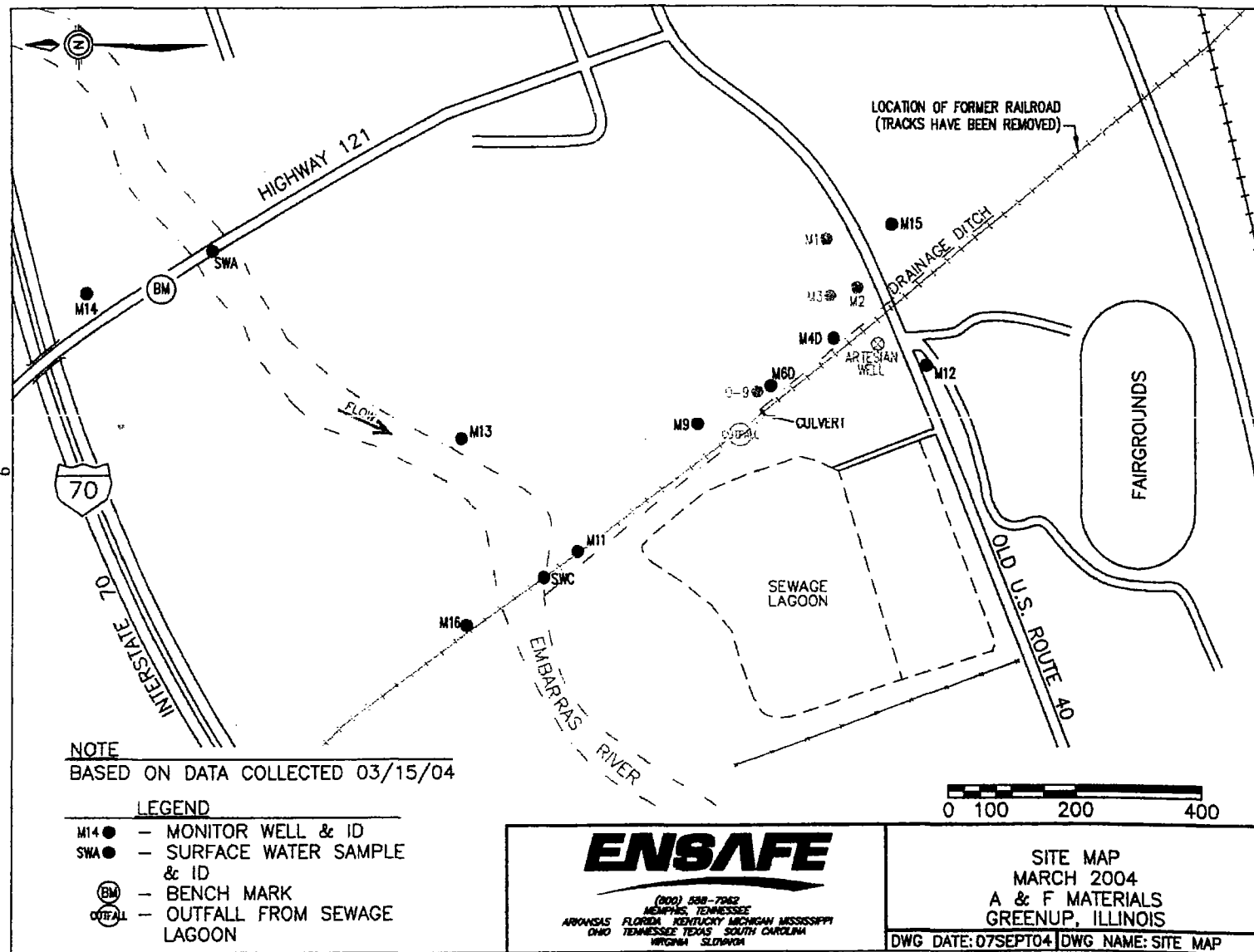


Figure 1. A & F Materials Area

Parameter	Table 1 Contaminants of Concern (mg/L, except as noted)		
	Maximum Level Found	Groundwater Action Limit	Max. Detected 4/92 (a,b)
Trichloroethylene	0.072	0.005	BDL
Phenolics	0.0185	0.001	BDL
Benzene	0.007	0.005	0.003
Total Organic Halogens	0.212	NA	BDL
Sulfates	3915	250	<b>1000</b>
Nitrates	1.8	10	2.3
Total Dissolved Solids	5468	500	<b>2600</b>
Oil & Grease	60	0.1	2
Chloride	69	250	68
Conductivity, $\mu$ mhos/cm	4300	NA	2600
Copper	0.18	0.02	BDL
Nickel	0.43	13.4	0.0554
Silver	0.035	0.005	BDL
Aluminum	77	NA	BDL
Zinc	1.9	1.0	BDL
Iron	242	0.30	<b>12.2</b>
Lead	0.325	0.05	BDL
Manganese	205	0.05	<b>5.43</b>
Chromium (+6)	0.170	0.05	BDL
Cadmium	0.014	0.01	BDL
Barium	6.8	1.0	0.0919
Arsenic	0.004	0.05	0.0061
Thallium	0.042	0.013	BDL

BDL = below detection limit; a) Data represent last quarter of 2nd year monitoring, April, 1992; b) Bolded value exceeds action limit.

For comparison, for iron and manganese, the following are risk based concentrations that are available from two USEPA regions; no risk based concentrations are available for sulfate and total dissolved solids.

Region 9 preliminary remediation goals (PRGs) for presence in tap water (October 2004):

iron--11 mg/L (based on USEPA provisional value for the reference dose)

manganese and compounds (non-food)--0.88 mg/L

Region 3 risk based concentrations (RBCs) for presence in tap water (October 2004):

iron--11 mg/L (based on USEPA provisional value for the reference dose)

manganese (non food)--0.73 mg/L

Illinois groundwater quality standards for Class I groundwater (potable resource groundwater) (35 IAC 620.410):

iron	5.0 mg/L	sulfate	400 mg/L
manganese	0.15 mg/L	total dissolved solids (TDS)	1200 mg/L



DRAFT 8/6/05

Table 2. Some Monitored Parameters  
Concentrations (mg/l), First Eleven Sampling Events  
A & F Material Reclaiming, Inc. Site, Greenup, Illinois

Parameter & Well <sup>(1)</sup>		July 1990 Q 1	October 1990 Q 2	January 1991 Q 3	April 1991 Q 4	July 1991 Q 5	October 1991 Q 6	January 1992 Q 7	April 1992 Q 8	October 1992 Q 10	April 1993 Q 12	October 1993 Q 14
Sulfate	M-4	190	310	125	120	190	560J	1100	680	370	140	120
	M-6	650	200	600	540	750	425J	430	660	690	360	550
	M-9	810	370	350	340	410	510J	840	1000	340	930	52
	M-11	200	140	26	45	110	160J	110	71	110	95	66
	M-12	170	280	740	51	11	85J	89	150	99	600	370
	M-13	54	46	40	35	51	52J	52	65	51	50	59
	M-15	50	38	40	640	2.7	36J	49	56	55	59	61
Iron	M-4	8.36	3.01	2.18	1.71	2.04	6.91	14.7J	7.52	2.37	0.628J	133J
	M-6	2.69	9.03	15.8	4.67	21.8	12.5	9.76J	12.2	12.8	12.0J	16.7J
	M-9	5.16	5.30	3.43	2.54	4.88	7.02	7.69J	7.12	2.01	12.6J	1.73J
	M-11	8.21	2.73	1.77	0.0848U	3.50	8.19	5.58J	3.63	5.64	5.95J	4.93J
	M-12	8.1	0.0490B	0.150	0.434	0.103	0.0379	0.0757J	0.0509U	0.046U	0.028UJ	0.019UJ
	M-13	16.9	1.02	0.440	0.121U	0.278	0.738	0.029UJ	0.314U	0.295	0.028UJ	0.019UJ
	M-15	1.74	0.0820B	1.14	0.0797U	1.34	0.0293J	0.148J	0.0692U	0.101	0.0588J	0.019UJ
Mn	M-4	1.86NJ	1.63	1.33	1.18	1.38J	2.73	4.99J	2.93	1.95	1.48	4.04J
	M-6	6.27NJ	4.51	6.94	4.80	6.68J	6.53	3.04J	5.43	6.27	5.17	6.64J
	M-9	3.79NJ	2.85	2.53	1.85	2.85J	2.58	3.49J	4.39	1.48	2.89	1.17J
	M-11	0.929NJ	0.463	0.422	0.592	0.521J	0.747	0.437J	0.402	0.572	0.735	0.649J
	M-12	1.38NJ	0.820	0.356	0.217	0.462J	0.453	0.421J	0.0775	0.437	0.0624	0.186J
	M-13	1.02NJ	0.614	0.602	0.483	1.18J	1.22	0.543J	0.805	0.864	0.482	0.820J
	M-15	0.645NJ	0.342	0.302	0.348	0.309J	0.390	0.268J	0.150	0.303	0.0664	0.0766J
TDS	M-4	820	910	610	650	760	1400J	2400	1400	1100	720	640
	M-6	1600	810	1600	1700	1950	1250J	1250	1600	1600	1000	1400
	M-9	1800	1100	1300	1200	1600	1600J	2200	2600	1100	2200	460
	M-11	760	620	390	430	600	660J	550	435	605	540	475
	M-12	740	1000	2100	350	640	520J	550	720	600	1800	1200
	M-13	480	440	420	460	560	490J	520	520	520	500	460
	M-15	280	300	210	2000	310	310J	330	310	320	300	260

Table 2 (con't)Some Monitored Parameters  
Concentrations (mg/l), Recent Sampling Events  
A & F Material Reclaiming, Inc. Site, Greenup, Illinois

Parameter & Well <sup>(1)</sup>		April 1994 Q 16	October 1994 Q 18	April 1995 Q 20	October 1995 Q 22	April 1996 Q 24	October 1996 Q 26	April 1997 Q 28	October 1997 Q 30	April 1998 Q 32	March 1999 Q 35	Nov/Dec 2000 Q 42	March 2004 Q 55
Sulfate	M-4	NR	NR	NS	NA	M-4	NA	NA	NA	NA	66	NA	NA
	M-6	<b>1000</b>	<b>440</b>	<b>322</b>	<b>300</b>	<b>450J</b>	<b>780</b>	160	<b>540</b>	220J	160	NA	NA
	M-9	49	240	<b>596</b>	244	<b>650J</b>	110	58	<b>460</b>	<b>260J</b>	190	81	<b>650</b>
	M-11	32	58	42.7	40.2	53J	64	99	154	50J	43	58	27
	M-12	210	97	64	52.3	190J	<b>330</b>	<b>660</b>	<b>560</b>	<b>710J</b>	<b>390</b>	<b>330</b>	210
	M-13	48	34	27.7	30.7	32J	50	54	230	32J	40	79	32
	M-15	73	66	ND	37.1	68J	75	90	120	64J	58	77	88
Iron	M-4	<b>34.7</b>	<b>1.92</b>	<b>5.61</b>	<b>1.4J</b>	<b>2.07</b>	<b>1.99J</b>	<b>1.53</b>	<b>3.62</b>	<b>4.43</b>	<b>0.812</b>	<b>1.9</b>	<b>1.20</b>
	M-6	<b>20.3</b>	<b>10.9</b>	<b>10.1</b>	<b>18.8J</b>	<b>14.3</b>	<b>17J</b>	<b>9.2</b>	<b>11.1</b>	<b>7.03</b>	<b>10.4</b>	<b>14.0</b>	<b>11.0</b>
	M-9	<b>2.95</b>	<b>4.17</b>	<b>8.13</b>	<b>7.06J</b>	<b>10.5</b>	<b>1.3J</b>	<b>0.658</b>	<b>2.92</b>	<b>3.72</b>	<b>6.07</b>	<b>5.4</b>	<b>18.0</b>
	M-11	<b>3.65</b>	<b>4.72</b>	<b>3.46</b>	<b>4.41J</b>	<b>3.17</b>	<b>1.95J</b>	<b>3.89</b>	<b>4.87</b>	<b>3.27</b>	<b>2.27</b>	<b>4.4</b>	<b>3.7</b>
	M-12	0.1U	0.072U	0.012U	0.0182UJ	0.006U	0.0377UJ	0.0179U	0.0063U	0.0155U	0.0188U	0.028*	0.032U
	M-13	0.1U	0.159U	<b>0.325</b>	0.0836UJ	<b>0.624</b>	0.136UJ	0.183U	<b>0.432</b>	0.171	0.0267*U	<b>0.55</b>	<b>0.41</b>
	M-15	0.1U	0.645U	0.012U	0.0174UJ	0.291	0.0185UJ	0.0056U	<b>0.394</b>	0.0155U	0.209	0.021*	0.032U
Mn	M-4	<b>1.91J</b>	<b>1.37</b>	<b>2.30</b>	<b>1.21J</b>	<b>1.24</b>	<b>1.27</b>	<b>1.06</b>	<b>1.63</b>	<b>1.8</b>	<b>1.23</b>	<b>1.1</b>	<b>1.10</b>
	M-6	<b>7.71J</b>	<b>6.30</b>	<b>5.77</b>	<b>7.71J</b>	<b>6.08</b>	<b>6.24</b>	<b>5.46</b>	<b>6.02</b>	<b>4.48</b>	<b>6.07</b>	<b>5.8</b>	<b>5.9</b>
	M-9	<b>1.38J</b>	<b>2.01</b>	<b>3.52</b>	<b>1.84J</b>	<b>3.2</b>	<b>0.794</b>	<b>0.496</b>	<b>1.13</b>	<b>1.53</b>	<b>1.7</b>	<b>0.97</b>	<b>2.6</b>
	M-11	<b>0.726J</b>	<b>0.564</b>	<b>0.837</b>	<b>0.597J</b>	<b>0.817</b>	<b>0.662</b>	<b>0.541</b>	<b>0.416</b>	<b>0.567</b>	<b>0.445</b>	<b>0.80</b>	<b>0.85</b>
	M-12	<b>0.158J</b>	<b>0.305</b>	0.049	<b>0.618J</b>	0.022U	<b>0.0786</b>	0.0315	0.0037J	0.0049*	0.0114*U	0.0005U	0.0022J
	M-13	<b>0.343J</b>	<b>1.09</b>	<b>1.06</b>	<b>0.903J</b>	<b>0.848</b>	<b>0.491</b>	<b>0.392</b>	<b>0.690</b>	<b>0.33</b>	<b>0.43</b>	<b>0.70</b>	<b>0.72</b>
	M-15	0.0189J	<b>0.166</b>	0.011B	<b>0.186J</b>	<b>0.099</b>	<b>0.445</b>	<b>0.103</b>	<b>0.431</b>	<b>0.141</b>	<b>0.214</b>	<b>0.21</b>	0.021
TDS	M-4	230	<b>660</b>	<b>1200</b>	<b>630</b>	<b>620</b>	<b>630</b>	<b>650</b>	<b>890</b>	<b>1000J</b>	<b>610</b>	<b>640</b>	<b>710</b>
	M-6	<b>2400</b>	<b>1300</b>	<b>1230</b>	<b>1050</b>	<b>1400</b>	<b>1500</b>	<b>590</b>	<b>610</b>	<b>640J</b>	<b>770</b>	<b>860</b>	<b>900</b>
	M-9	<b>510</b>	<b>880</b>	<b>1700</b>	<b>724</b>	<b>1700</b>	<b>510</b>	400	<b>650</b>	<b>830J</b>	<b>990</b>	<b>700</b>	<b>1200</b>
	M-11	345	425	412	380	405	430	410	405	370J	440	<b>420</b>	430
	M-12	<b>780</b>	<b>500</b>	<b>522</b>	<b>566</b>	<b>800</b>	<b>1000</b>	<b>1700</b>	<b>1600</b>	<b>1500J</b>	<b>1600</b>	<b>900</b>	<b>790</b>
	M-13	400	410	442	388	400	390	400	430	420J	430	430	410
	M-15	240	250	258	342	<b>600</b>	<b>840</b>	350	340	380J	380	350	280

<sup>(1)</sup>Where a duplicate was collected, concentration value is the average of the sample and the duplicate.

Values in bold exceed the EDD action levels. Mn = manganese. TDS = total dissolved solids. NA = not applicable. NR = not reported. NS = not sampled. ND = not detected. U = analyzed for but not detected. J = estimated concentration. B = reported value is below contract required detection limit. \* = analyte was detected in a blank also. Q = quarter.